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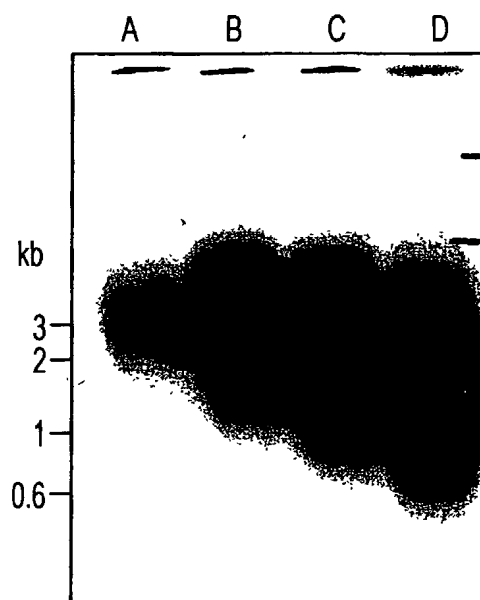


FIG. 1

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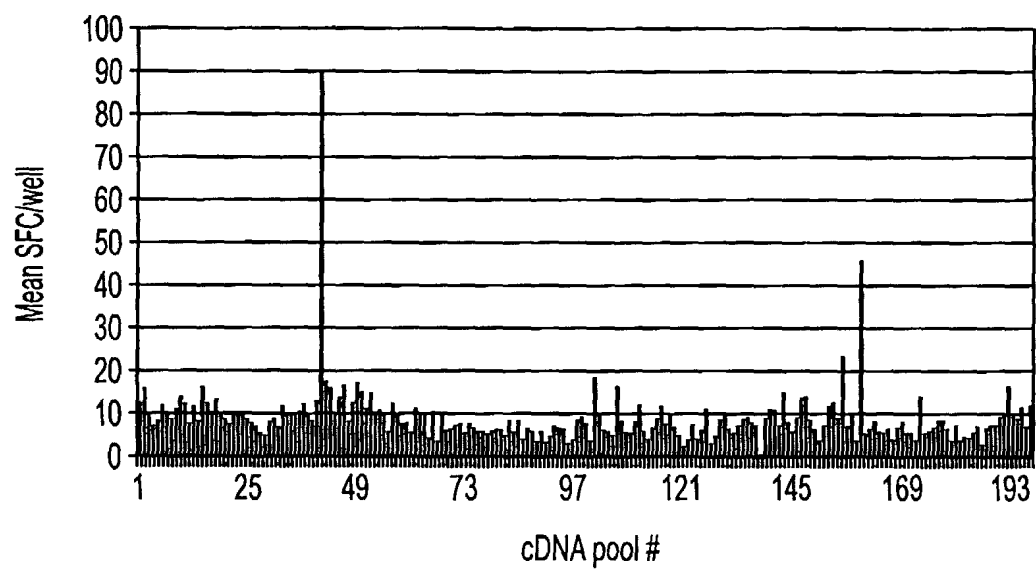


FIG. 2

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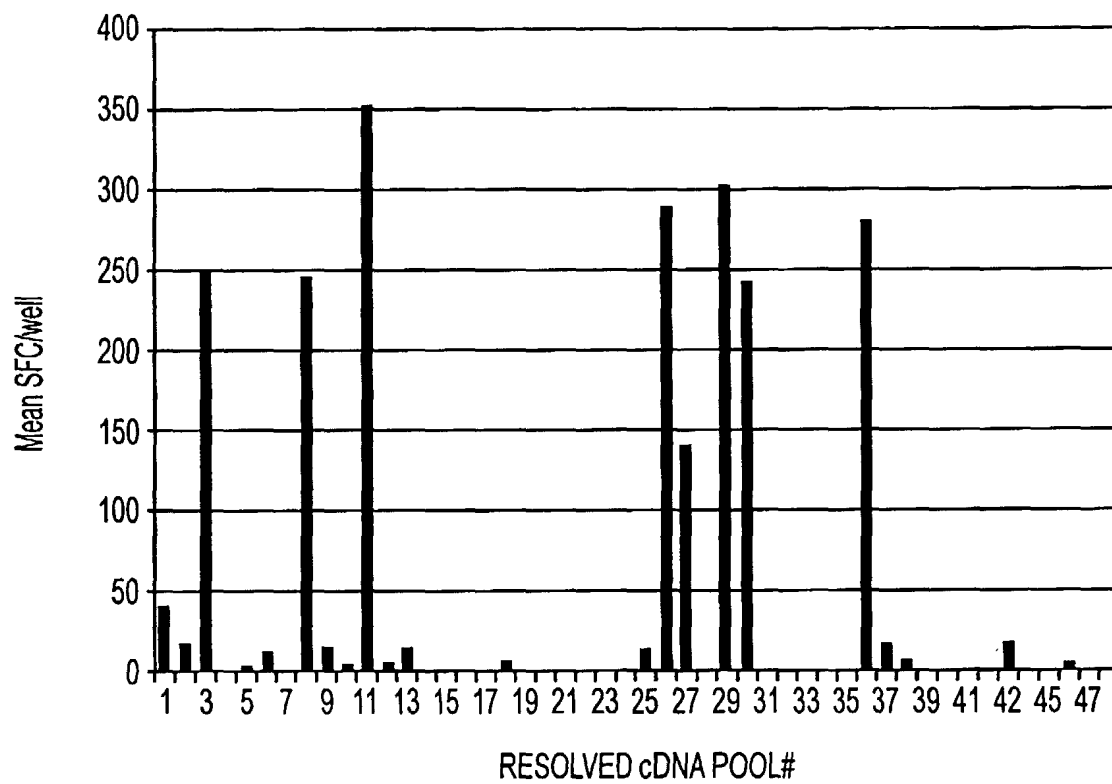


FIG. 3

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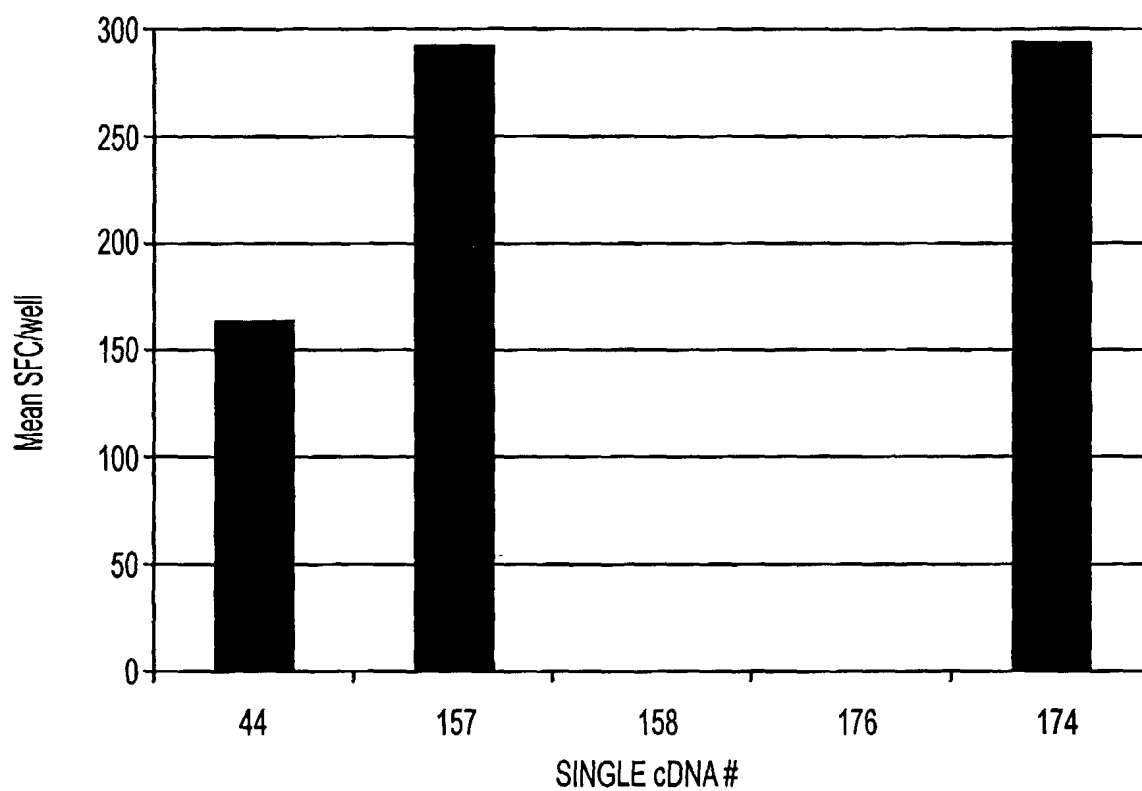


FIG. 4

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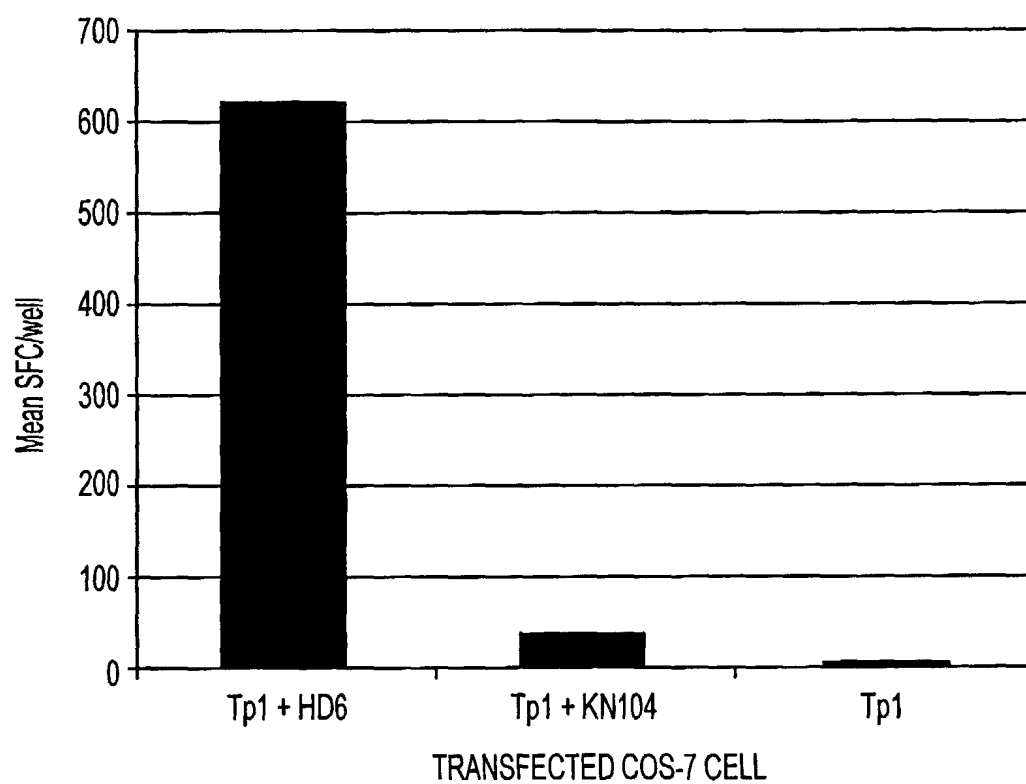


FIG. 5

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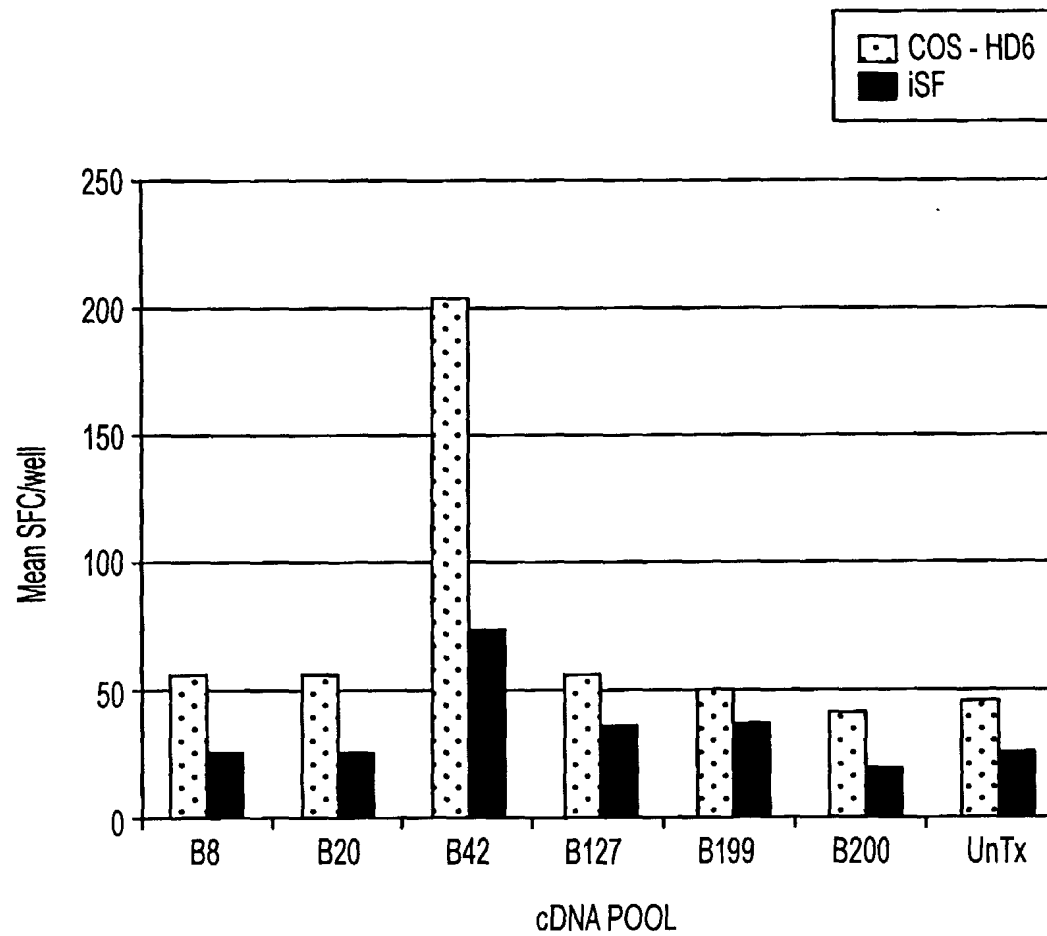


FIG. 6

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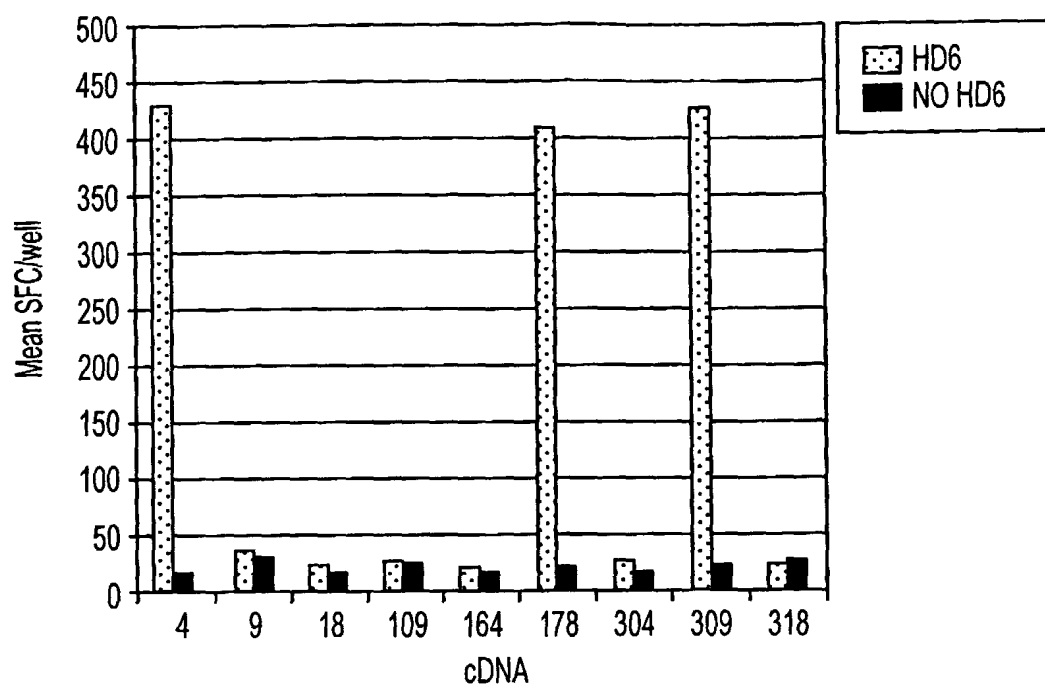


FIG. 7A

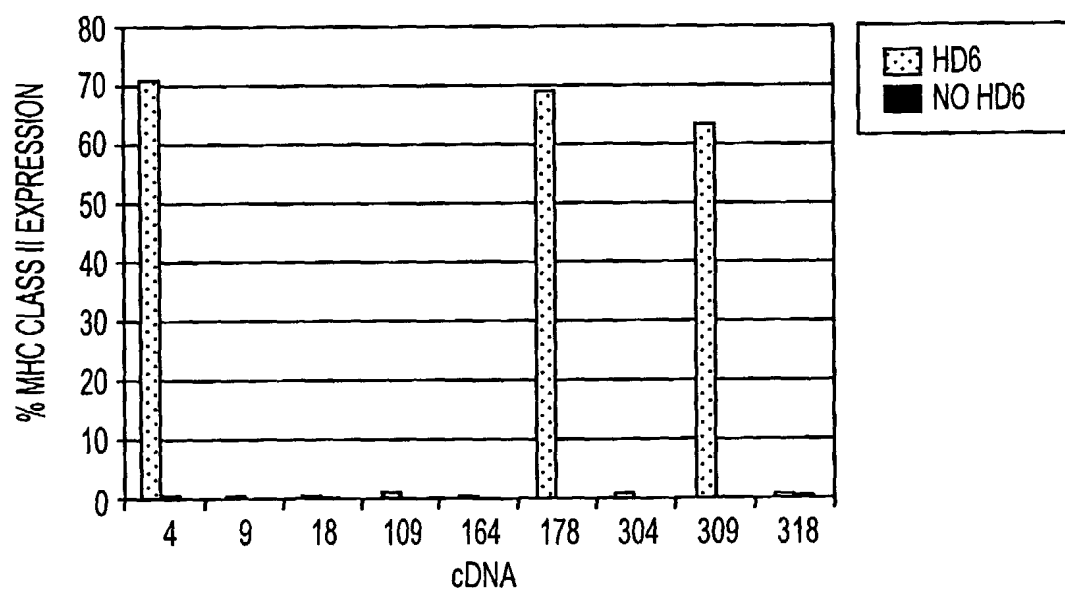


FIG. 7B

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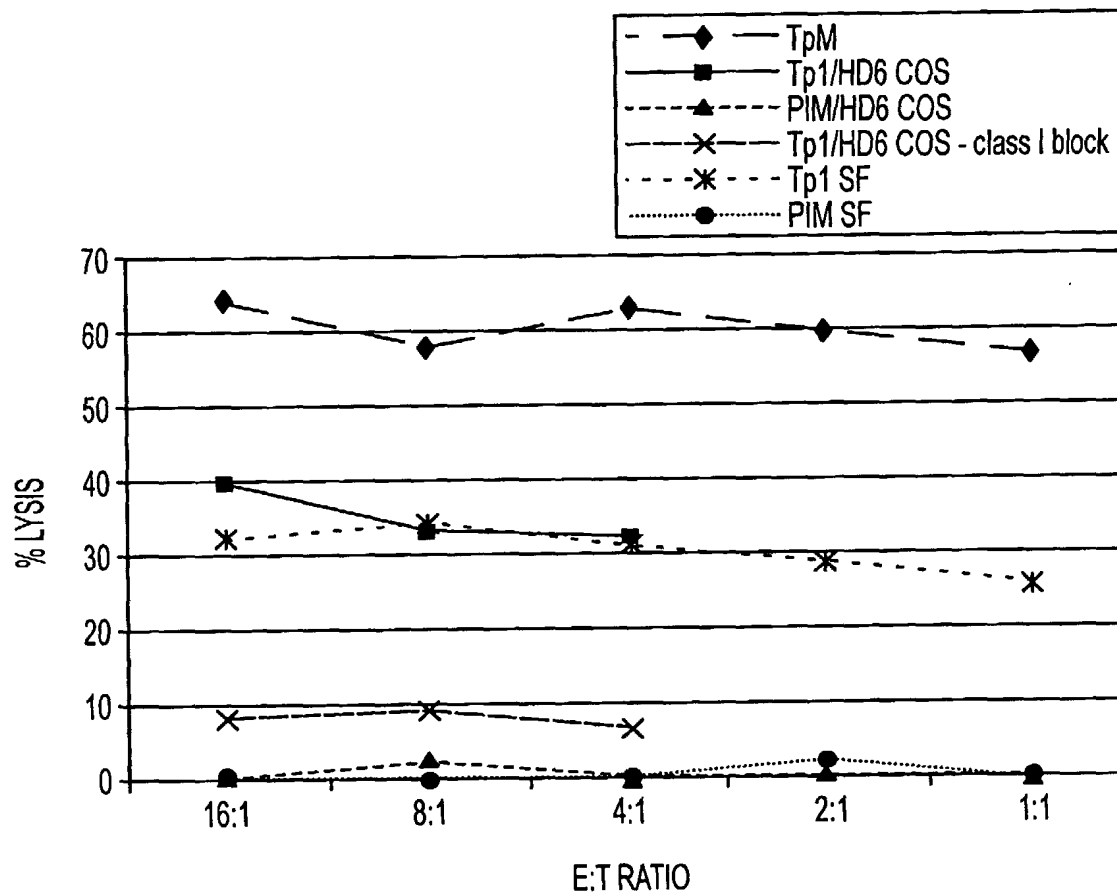


FIG. 8



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|          | 10         | 20         | 30         | 40         | 50         | 60         | 70         |
|----------|------------|------------|------------|------------|------------|------------|------------|
| 80       |            |            |            |            |            |            |            |
| Tp1 ORF  | MRVKKVLLYT | LPVVGILLAG | SLIIFNFVRK | RPEKEEELKP | PSALEDELKK | REBESRKRME | EMQKEILEKK |
| Tp1 Del1 | MRVKKVLLYT | LPVVGILLAG | SLIIFNFVRK | RPEKEEELKP | PSALEDELKK | REBESRKRME | EMQKEILEKK |
| Tp1 Del2 | MRVKKVLLYT | LPVVGILLAG | SLIIFNFVRK | RPEKEEELKP | PSALEDELKK | REBESRKRME | EMQKEILEKK |
| Tp1 Del3 | MRVKKVLLYT | LPVVGILLAG | SLIIFNFVRK | RPEKEEELKP | PSALEDELKK | REBESRKRME | EMQKEILEKK |
| Tp1 Del4 | MRVKKVLLYT | LPVVGILLAG | SLIIFNFVRK | RPEKEEELKP | PSALEDELKK | REBESRKRME | EMQKEILEKK |
| Tp1 Del5 | MRVKKVLLYT | LPVVGILLAG | SLIIFNFVRK | RPEKEEELKP | PSALEDELKK | REBESRKRME | EMQKEILEKK |
| Tp1 Del6 | MRVKKVLLYT | LPVVGILLAG | SLIIFNFVRK | RPEKEE...  | .....      | .....      | .....      |
|          | 90         | 100        | 110        | 120        | 130        | 140        | 150        |
| Tp1 ORF  | LEKREKEVVD | EFAKHLKKPE | ERLPKIILTL | DSGFPTVDPI | TYTSGVYMVA | VSKTTFTSDS | DLVDFTHTL  |
| Tp1 Del1 | LEKREKEVVD | EFAKHLKKPE | ERLPKIILTL | DSGFPTVDPI | TYTSGVYMVA | VSKTTFTSDS | DLVDFTHTL  |
| Tp1 Del2 | LEKREKEVVD | EFAKHLKKPE | ERLPKIILTL | DSGFPTVDPI | TYTSGVYMVA | VSKTTFTSDS | DLVDFTHTL  |
| Tp1 Del3 | LEKREKEVVD | EFAKHLKKPE | ERLPKII... | DSGFPTVDPI | TYTSGVYMVA | VSKTTFTSDS | DLVDFTHTL  |
| Tp1 Del4 | LEKREKEVVD | EFAKHLKKPE | ERLPKII... | .....      | .....      | .....      | .....      |
| Tp1 Del5 | LEKREKEVVD | EFAKHLKKPE | ERL.....   | .....      | .....      | .....      | .....      |
| Tp1 Del6 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
|          | 170        | 180        | 190        | 200        | 210        | 220        | 230        |
| Tp1 ORF  | FGGKTYTIKP | IEATMATSIA | FAADPGFCYF | LLIPGPDSPK | IFFKNDGDKF | LRCVGYPKVK | EEMLEMATKF |
| Tp1 Del1 | FGGKTYTIKP | IEATMATSIA | FAADPGFCYF | LLIPGPDSPK | IFFKNDGDKF | LRCVGYPKVK | EEMLEMATKF |
| Tp1 Del2 | FGGKTYTIKP | IEATMATSIA | FAADPGFCYF | LLIPGPDSPK | IFFKNDGDKF | LRCVGYPKVK | EEMLEMATKF |
| Tp1 Del3 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del4 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del5 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del6 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
|          | 250        | 260        | 270        | 280        | 290        | 300        | 310        |
| Tp1 ORF  | APPGVKPEAP | TPTPTTITPS | VPPTIPTPIT | PSAPPTTPPT | GLNFNLTVQN | KFMIGSQEVK | LNITHEYEGV |
| Tp1 Del1 | APPGVKPEAP | TPTPTTITPS | VPPTIPTPIT | PSAPPTTPPT | GLNFNLTVQN | KFMIGSQEVK | LNITHEYEGV |
| Tp1 Del2 | A.....     | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del3 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del4 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del5 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del6 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
|          | 330        | 340        | 350        | 360        | 370        | 380        | 390        |
| Tp1 ORF  | GSFTPTSFSI | GDLPQTGLPV | NQTVDTIVVY | FHRVTMGEPV | GIPLIVLIFY | KNQSRKYLNK | GNGNWEESKA |
| Tp1 Del1 | GSFTPTSFSI | GDLPQTGLPV | NQTVDTIVVY | FHRVTMGEPV | GIPLIVLIFY | KNQSRKYLNK | GNGNWEESKA |
| Tp1 Del2 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del3 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del4 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del5 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del6 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
|          | 410        | 420        | 430        | 440        | 450        | 460        | 470        |
| Tp1 ORF  | DSIFNDFVTV | NLSRRSDYYR | NGTGTSEIEQ | TLDNMVYVEP | DTPCAGWTTY | IHKLEEGGEG | GIEKPFQIRQ |
| Tp1 Del1 | DSIFNDFVTV | NLSRRSDYYR | NGTGTSEIEQ | TLDNMVYVEP | DTPCAGWTTY | IHKLEEGGEG | GIEKPFQIRQ |
| Tp1 Del2 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del3 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del4 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del5 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del6 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
|          | 490        | 500        | 510        | 520        | 530        | 540        | 550        |
| Tp1 ORF  | FPMGKVSIVN | VYGKNDPELS | YAPSIFSVIR | EDGIQIFYVR | AYSQYLLDSS | VNPQNLPQKL | NTL*.....  |
| Tp1 Del1 | FPMGKVSIVN | VYGKNDPELS | YAPSIFSVIR | EDGIQIFYVR | AYSQYLLDSS | VNPQNLPQKL | NTL*.....  |
| Tp1 Del2 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del3 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del4 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del5 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |
| Tp1 Del6 | .....      | .....      | .....      | .....      | .....      | .....      | .....      |

FIG. 9

SUBSTITUTE SHEET (RULE 26)

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|       |          |            |            |            |            |
|-------|----------|------------|------------|------------|------------|
|       | 200      | 210        | 220        | 230        | 240        |
| Tp1.1 | mPGPDSKP | IFFKNDGDKF | LRCVGYPKVK | EEMLEMATKF | NRLPKGVEIP |
| Tp1.2 |          |            |            |            |            |
| Tp1.3 |          |            |            |            |            |
| Tp1.4 | mPGPDSKP | IFFKNDGDKF | LRCVGYPKVK | EEMLEMATKF | NRLPKGVEIP |
| Tp1.5 |          |            |            |            |            |
| Tp1.6 | mPGPDSKP | IFFKNDGDKF | LRCVGYPKVK | EEMLEMATKF | NRLPKGVEIP |

|       |            |            |            |            |             |
|-------|------------|------------|------------|------------|-------------|
|       | 250        | 260        | 270        | 280        | 290         |
| Tp1.1 | APPGVKPEAP | TPTPTTIT   |            |            |             |
| Tp1.2 | mP         | TPTTITPS   | VPPTIPTPIT | PSAPPTTPPT | GLNFNLTIVQN |
| Tp1.3 |            |            |            |            |             |
| Tp1.4 | APPGVKPEAP | TPTTITPSVP | PTIPTPITPS | APPTTPPTGL | NFNLTIVQNKF |
| Tp1.5 | mP         | TPTTITPSVP | PTIPTPITPS | APPTTPPTGL | NFNLTIVQNKF |
| Tp1.6 | APPGVKPEAP | TPTTITPSVP | PTIPTPITPS | APPTTPPTGL | NFNLTIVQNKF |

|       |            |            |            |            |            |
|-------|------------|------------|------------|------------|------------|
|       | 300        | 310        | 320        | 330        | 340        |
| Tp1.1 |            |            |            |            |            |
| Tp1.2 | KFMIGSQEVK | LNITHEYEGV | YEAHKYFI   |            |            |
| Tp1.3 |            | mGV        | YEAHKYFIER | GSFTPTSFSI | GDLPQTGLPV |
| Tp1.4 | KFMIGSQEVK | LNITHEYEGV | YEAHKYFIER | GSFTPTSFSI | GDLPQTGLPV |
| Tp1.5 | KFMIGSQEVK | LNITHEYEGV | YEAHKYFIER | GSFTPTSFSI | GDLPQTGLPV |
| Tp1.6 | KFMIGSQEVK | LNITHEYEGV | YEAHKYFIER | GSFTPTSFSI | GDLPQTGLPV |

|       |            |            |           |
|-------|------------|------------|-----------|
|       | 350        | 360        | 369       |
| Tp1.1 |            |            |           |
| Tp1.2 |            |            |           |
| Tp1.3 | NQTVDTIVVY | FHRVTMGEPV | GIPLIVLIF |
| Tp1.4 |            |            |           |
| Tp1.5 | NQTVDTIVVY | FHRVTMGEPV | GIPLIVLIF |
| Tp1.6 | NQTVDTIVVY | FHRVTMGEPV | GIPLIVLIF |

FIG. 10

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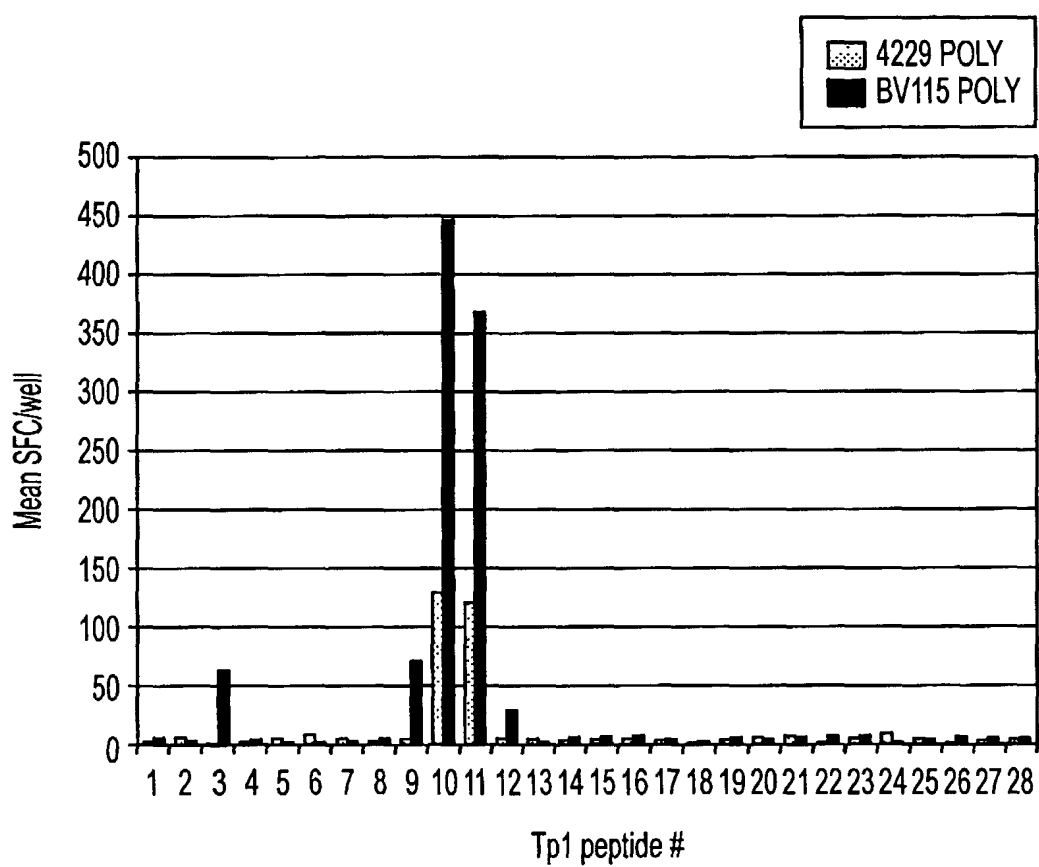


FIG. 11

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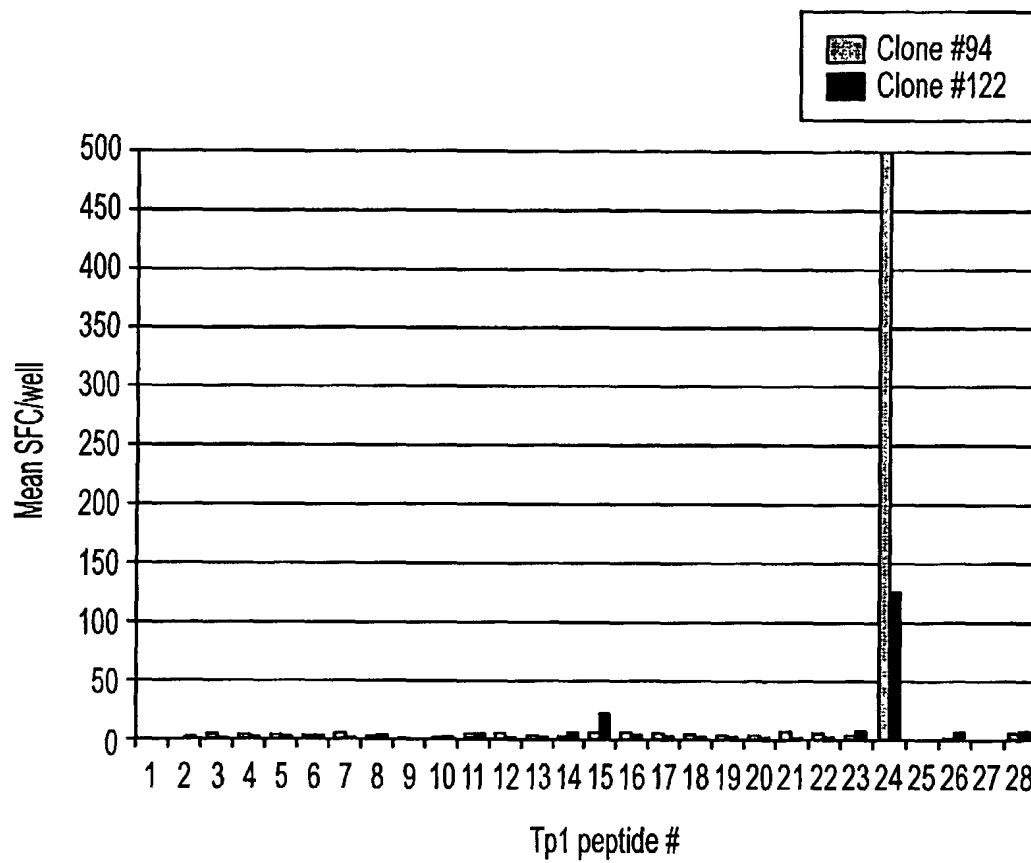


FIG. 12

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|               | 10          | 20            | 30              | 40             | 50        | 60                     |
|---------------|-------------|---------------|-----------------|----------------|-----------|------------------------|
| Tp1Muguga     | MRVKKVLLYTL | PVVGILLAGSLII | IFNFVRKRPEKEEEL | KPPSALEDELKKRE | EEESRKRME |                        |
| Tp1Marikebuni | MRVKKVLLYTL | PVVGILLAGSLII | IFNFVRKRPEKEEEL | KPPSALEDELKKRE | EEESRKRME |                        |
|               | 10          | 20            | 30              | 40             | 50        | 60                     |
|               | 70          | 80            | 90              | 100            | 110       | 120                    |
| Tp1Muguga     | EMQKEILEKKL | REGKKALEELEK  | REKEVVDEF       | AKHLKKPEERLP   | KIILTLD   | SGFPTVDPI              |
| Tp1Marikebuni | EMQKEILEKKL | REGKKALEELEK  | CEKEMVDEF       | EKHLKKPEERLP   | KIILTLD   | SGFPTVDPI              |
|               | 70          | 80            | 90              | 100            | 110       | 120                    |
|               | 130         | 140           | 150             | 160            | 170       | 180                    |
| Tp1Muguga     | TYTSGVY     | MVAVSKTTFT    | SDSDLVDF        | THTLLGIKFL     | VTGVQFGGK | TYTIKPIEATMATSIA       |
| Tp1Marikebuni | TYTSGVY     | MVAVSKTTFT    | SDSDLVDF        | THTLLGIKFL     | VAGVQFGGK | TYTIKPIEATMATSIA       |
|               | 130         | 140           | 150             | 160            | 170       | 180                    |
|               | 190         | 200           | 210             | 220            | 230       | 240                    |
| Tp1Muguga     | FAADPGFCY   | FLLIPGPD      | SKPIFFKNDG      | DKFLRCVGY      | PKVKEEMLE | MATKFNRLPKGVEIP        |
| Tp1Marikebuni | FAADPGFCY   | FLLIPGPD      | SKPIFFKNDG      | DKFLRCVGY      | PKVKEEIE  | MATKFNRLPKGVEIP        |
|               | 190         | 200           | 210             | 220            | 230       | 240                    |
|               | 250         | 260           | 270             | 280            | 290       | 300                    |
| Tp1Muguga     | APPGVKPE    | APTPTPTTIT    | PSVPPTIPT       | PTPSAPPTT      | PPTGLNF   | NLTVQNKFMIGSQEVK       |
| Tp1Marikebuni | APPGVKPE    | APTPTPTTIT    | PSVPPTIPT       | PTPSAPPTT      | PPTGLNF   | NLTVQNKFMVGSQEVK       |
|               | 250         | 260           | 270             | 280            | 290       | 300                    |
|               | 310         | 320           | 330             | 340            | 350       | 360                    |
| Tp1Muguga     | LNITHEY     | EGVYEAHKY     | FIERGSFT        | PPTSFSIG       | DLPQTGL   | PNQTVDTIVVYFHRVTMGE    |
| Tp1Marikebuni | LNITHEY     | DGVYEAHKY     | FIKGRFT         | PPTSFSIG       | ADPQTGL   | PNQTVDTIVVYFHRVTMGE    |
|               | 310         | 320           | 330             | 340            | 350       | 360                    |
|               | 370         | 380           | 390             | 400            | 410       | 420                    |
| Tp1Muguga     | GIPLIVL     | IFYKNQSRK     | YLNKGNGN        | WEESKALL       | FREELDY   | LDSIFNDFVTVNLSRRSDYYR  |
| Tp1Marikebuni | GIPLIVL     | IFYKNQSTK     | YLNKGNGN        | WEESKALL       | FREELD    | FLDSMFNGYVTVNLSRRSDYYR |
|               | 370         | 380           | 390             | 400            | 410       | 420                    |
|               | 430         | 440           | 450             | 460            | 470       | 480                    |
| Tp1Muguga     | NGTGTSE     | IEQTLDMN      | VYVEPDTP        | CAGWTTYI       | HKLEEGG   | EGGIEKPFQIRQLWFSKQKFDI |
| Tp1Marikebuni | NGTGTSE     | IEKTLDMN      | VYVEPDTP        | CLGWTTYI       | HKLEEGG   | EGGIEKPFQIRQLWFSKQKFDI |
|               | 430         | 440           | 450             | 460            | 470       | 480                    |
|               | 490         | 500           | 510             | 520            | 530       | 540                    |
| Tp1Muguga     | FPMGKVS     | IVNVYGK       | NDEPLSY         | APSIFSV        | IREDDGI   | QIFYVRAYSQYLLDSSVNPQNL |
| Tp1Marikebuni | FPMGKVS     | IVNVYGK       | NDEPLSY         | APSIFSV        | IREDDGI   | QIFYVRAYSQYLLDSSVNPQNL |
|               | 490         | 500           | 510             | 520            | 530       | 540                    |
| Tp1Muguga     | NTL         |               |                 |                |           |                        |
| Tp1Marikebuni | TAE         |               |                 |                |           |                        |

FIG. 13

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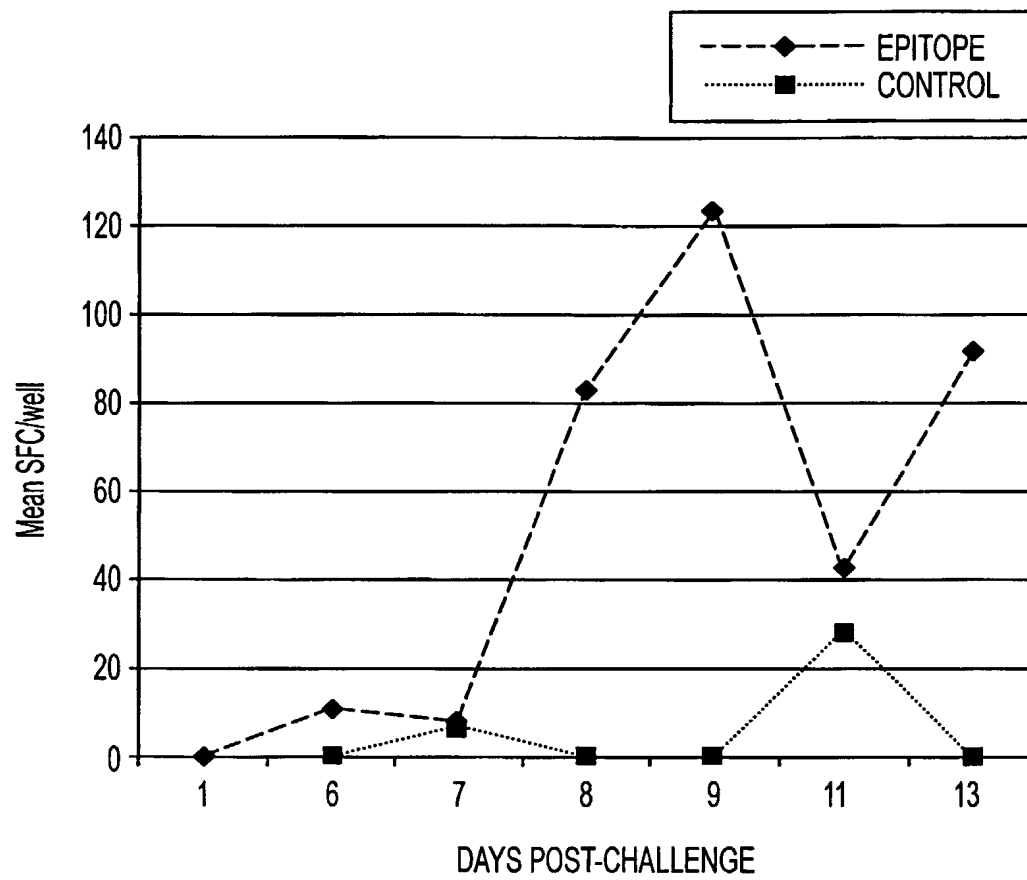


FIG. 14

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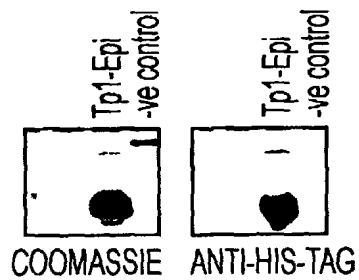


FIG. 15A

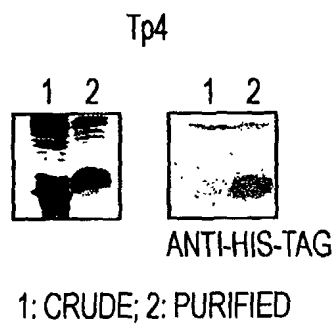
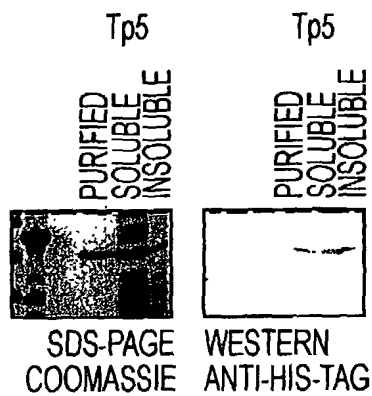


FIG. 15B



FULL-LENGTH Tp5

FIG. 15C

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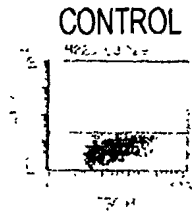


FIG. 16Aa

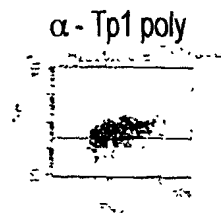


FIG. 16Ab

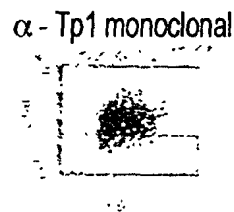


FIG. 16Ac

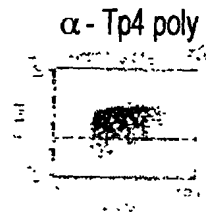


FIG. 16Ad

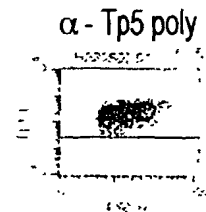


FIG. 16Ae

| ANTIBODY               | % OF T. PARVA INFECTED CELLS STAINED |
|------------------------|--------------------------------------|
| Anti-Tp1 polyclonal Ab | 78                                   |
| Anti-Tp1 monoclonal Ab | 85.96                                |
| Anti-Tp4 polyclonal Ab | 92.52                                |
| Anti-Tp5 polyclonal Ab | 96.04                                |
| Control                | 0.32                                 |

FIG. 16B



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|                 |                |                     |                     |             |                       |
|-----------------|----------------|---------------------|---------------------|-------------|-----------------------|
| TP1             | MATSI          | AFAADPGFCYFLLIPGPD  | SKPIFFKNDGDKFLRCVGP | PKVKEEMLEMA | TKFNRLPKGVEIPAPPGVK   |
| Kakuzi521       | MATSI          | AFAADPGFCYFLLIPGPD  | SKPIFFKNDGDKFLRCVGP | PKVKEEMLEMA | TKFNRLPKGVEIPAPPGVK   |
| NyairoIL02      | MATSI          | AFAADPGFCYFLLIPGPD  | SKPIFFKNDGDKFLRCVGP | PKVKEEMLEMA | TKFNRLPKGVEIPAPPGVK   |
| NyairoIL17      | MATSI          | AFAADPGFCYFLLIPGPD  | SKPIFFKNDGDKFLRCVGP | PKVKEEMLEMA | TKFNRLPKGVEIPAPPGVK   |
| Kakuzi521       | MATSI          | AFAADPGFCYFLLIPGPD  | SKPIFFKNDGDKFLRCVGP | PKVKEEMLEMA | TKFNRLPKGVEIPAPPGVK   |
| Buffalo7344c1   | MATSI          | AFAADPGFCYFLLIPGPD  | SKPIFFKNDGDKFLRCVGP | PKVKEEMLEMA | TKFNRLPKGVEIPAPPGVK   |
| KilifiKL2       | MATSI          | AFAADPGFCYFLLIPGPD  | SKPIFFKNDGDKFLRCVGP | PKVKEEMLEMA | TKFNRLPKGVEIPAPPGVK   |
| D409TpMariakani | MATSI          | AFAADPGFCYFLLIPAP-- | KPIFFKNDGDKFLRCVGP  | PKVKEEMLEMA | TKFNRLPKGVEIPAPPGVK   |
| KilifiBR305     | MATSI          | AFAADPGFCYFLLIPGPD  | SKPIFFKNDGDKFLRCVGP | PKVKEEMLEMA | TKFNRLPKGVEIPAPPGVK   |
| KilifiKL1       | MATSI          | AFAADPGFCYFLLIPGPD  | SKPIFFKNDGDKFLRCVGP | PKVKEEMLEMA | TKFNRLPKGVEIPAPPGVK   |
| Zambia2         | MATSI          | AFAADPGFCYFLLIPGPD  | SKPIFFKNDGDKFLRCVGP | PKVKEEMLEMA | TKFNRLPKGVEIPAPPGVK   |
| Uganda          | MATSI          | AFAADPGFCYFLLIPGPD  | SKPIFFKNDGDKFLRCVGP | PKVKEEMLEMA | TKFNRLPKGVEIPAPPGVK   |
| TP1             | PEATPTPTTITPSV | PPTIPTPTPSAPP       | TTPTTGLNFNLT        | VQNKFMIGSQ  | EVKLNITHEYEGVYEAHKYFI |
| Kakuzi521       | PEATPTPTTITPSV | PPTIPTPTPSAPP       | TTPTTGLNFNLT        | VQNKFMIGSQ  | EVKLNITHEYEGVYEAHKYFI |
| NyairoIL02      | PEATPTPTTITPSV | PPTIPTPTPSAPP       | TTPTTGLNFNLT        | VQNKFMIGSQ  | EVKLNITHEYEGVYEAHKYFI |
| NyairoIL17      | PEATPTPTTITPSV | PPTIPTPTPSAPP       | TTPTTGLNFNLT        | VQNKFMIGSQ  | EVKLNITHEYEGVYEAHKYFI |
| Kakuzi521       | PEATPTPTTITPSV | PPTIPTPTPSAPP       | TTPTTGLNFNLT        | VQNKFMIGSQ  | EVKLNITHEYEGVYEAHKYFI |
| Buffalo7344c1   | PEATPTPTTITPSV | PPTIPTPTPSAPP       | TTPTTGLNFNLT        | VQNKFMIGSQ  | EVKLNITHEYEGVYEAHKYFI |
| KilifiKL2       | PEATPTPTTITPSV | PPTIPTPTPSAPP       | TTPTTGLNFNLT        | VQNKFMIGSQ  | EVKLNITHEYEGVYEAHKYFI |
| D409TpMariakani | PEATPTPTTITPSV | PPTIPTPTPSAPP       | TTPTTGLNFNLT        | VQNKFMIGSQ  | EVKLNITHEYEGVYEAHKYFI |
| KilifiBR305     | PEATPTPTTITPSV | PPTIPTPTPSAPP       | TTPTTGLNFNLT        | VQNKFMIGSQ  | EVKLNITHEYEGVYEAHKYFI |
| KilifiKL1       | PEATPTPTTITPSV | PPTIPTPTPSAPP       | TTPTTGLNFNLT        | VQNKFMIGSQ  | EVKLNITHEYEGVYEAHKYFI |
| Zambia2         | PEATPTPTTITPSV | PPTIPTPTPSAPP       | TTPTTGLNFNLT        | VQNKFMIGSQ  | EVKLNITHEYEGVYEAHKYFI |
| Uganda          | PEATPTPTTITPSV | PPTIPTPTPSAPP       | TTPTTGLNFNLT        | VQNKFMIGSQ  | EVKLNITHEYEGVYEAHKYFI |

FIG. 17

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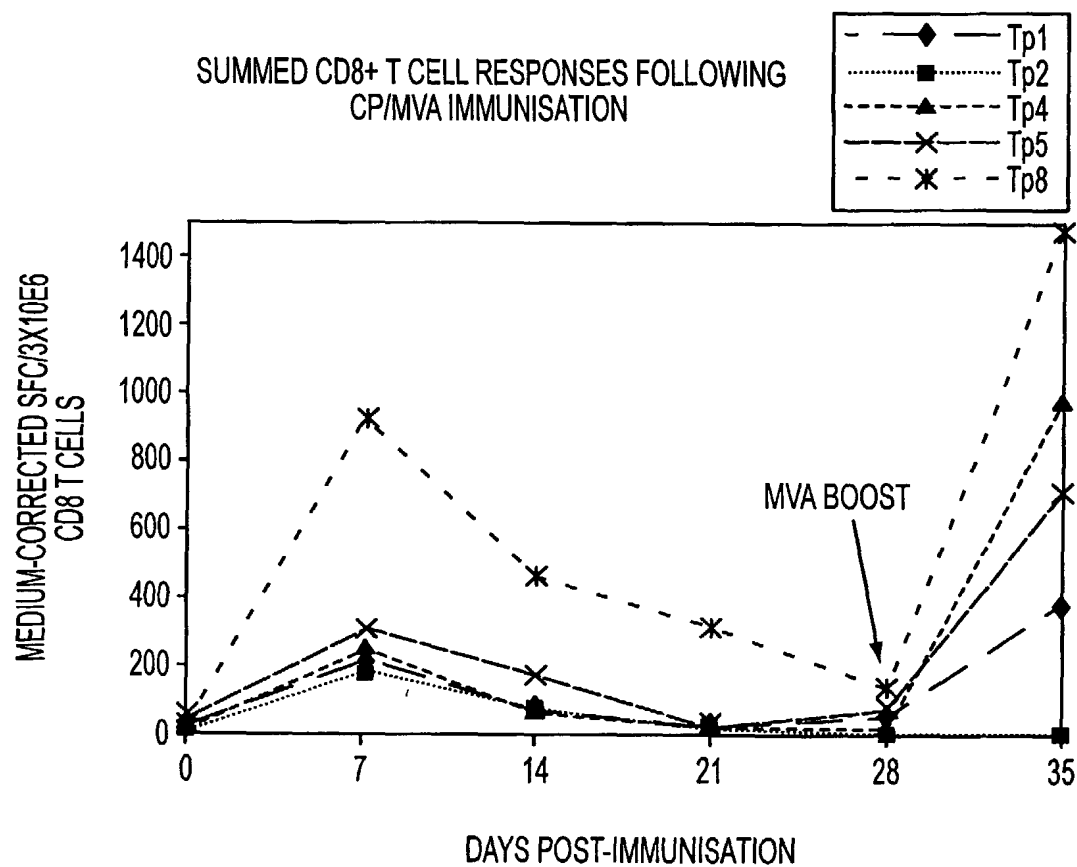


FIG. 18

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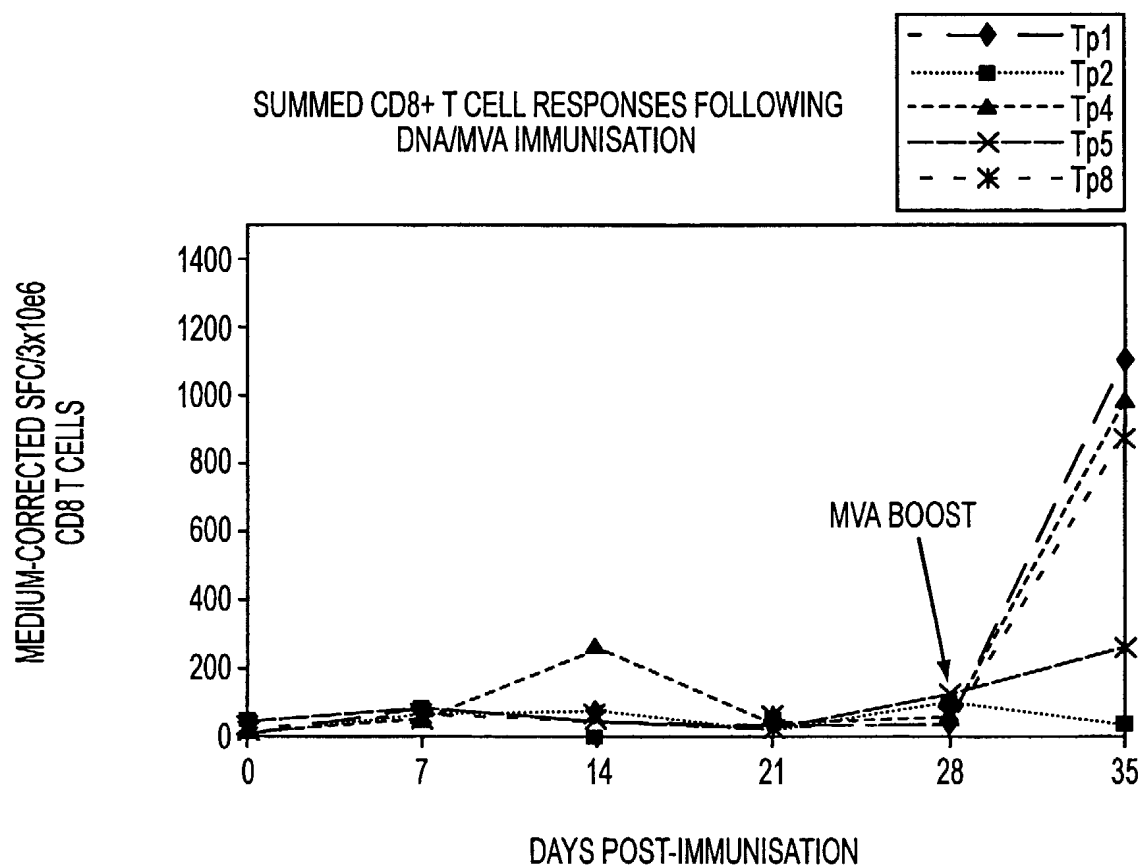


FIG. 19

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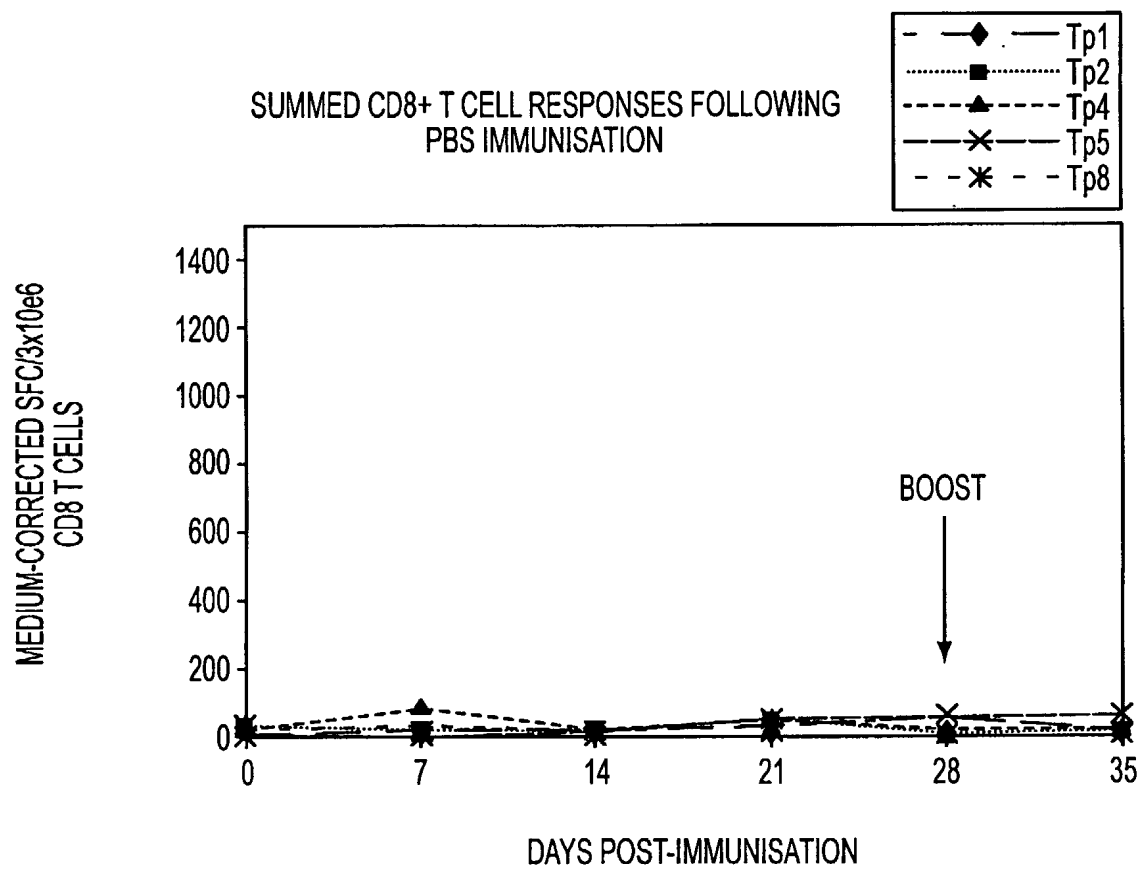


FIG. 20